Monitoring and Evaluation Needs for Assessing Bull Trout Recovery

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Bull Trout M&E Workshop

Resort at the Mountain, Oregon

October 31-November 1, 2001

Figure 1

Overview for Bull Trout

- Historically, bull trout ranged throughout the west
- Historically, occupied 60% of Columbia Basin
- Bull Trout declined in many parts of the range
  - Fragmentation (dams,barriers & targeted extermination)
  - Degraded habitat (especially large river systems)
  - Poor water quality
  - Introduced species
- Presently, found primarily in upper tribs., lakes, and reservoirs
- Presently, occur in 45% of historic range
- Listed as threatened in coterminous U.S. in 1999

Figure 2

Overview for Bull Trout

- Development of Recovery Plan started Jan. 1999
- Goal of Recovery Plan
  - Provide guidance on recovery of a listed species and their habitat
  - Recovery- species becomes secure, self-sustaining component of the ecosystem
  - Bull Trout Recovery
    - Reduce threats to long-term persistence
    - Multiple interconnected pops. across diverse habitats
    - Preserve diversity of life-history strategies
  - Develop standardized guidance for Monitoring and Evaluation of populations

Figure 3

Workshop Objectives

- Consistent monitoring protocols for indicators of population status and overall design of monitoring and evaluation program that will support USFWS recovery assessments;
- Identify monitoring and evaluation challenges in recovery assessments, explore potential solutions to these problems, future directions; and
- Assess the utility of forming a standing Research, Monitoring, and Evaluation Technical Advisory Group, and possible tasks for such a group.

Figure 4

Draft RECOVERY PLAN

Goal: *'ensure long-term persistence of self-sustaining, complex interacting groups of bull trout distributed across the species native range'*

Objectives:

- **Maintain current distribution and restore distribution in some areas**
- **Maintain stable or increasing trends in abundance**
- Restore and maintain suitable habitat
- Conserve genetic diversity and provide for exchange

Figure 5

Bull Trout Recovery Units

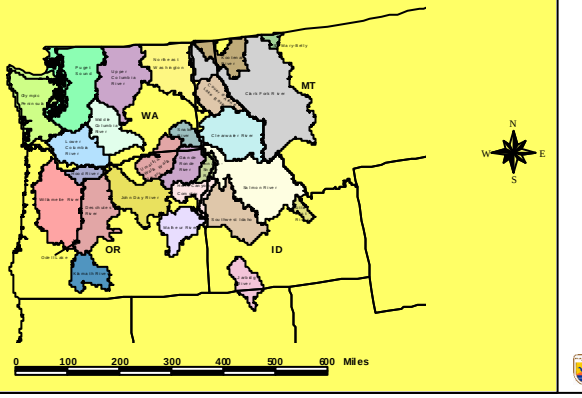

Figure 6

Challenges for Columbia River Bull Trout DPS

- 22 Recovery Units (essential scale for recovery plan)
- Core populations and areas functional evaluation unit (variety of habitats and logistical issues)
- Measure:
  - Abundance (adults)
  - Trends in Abundance (spawning population)
  - Change in spatial distribution (over the life-cycle)
- Complex life-history & elusive behavior
- How do we effectively deploy limited resources to measure these attributes?

Figure 7

Problem: Uncertainty and ability to detect Bull Trout Local Population Status

- Critical to detect further declines at local and regional population levels
- Need to evaluate the effects of recovery measures on trends of local and regional populations
- Data time series are often short and highly variable
- Limits the power to detect a trend in the data

Figure 8

Model of population growth:

$N(t+1) = \lambda N(t)$

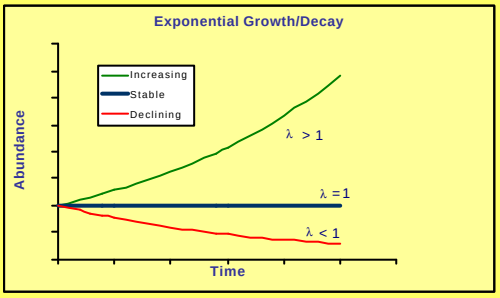

Figure 9

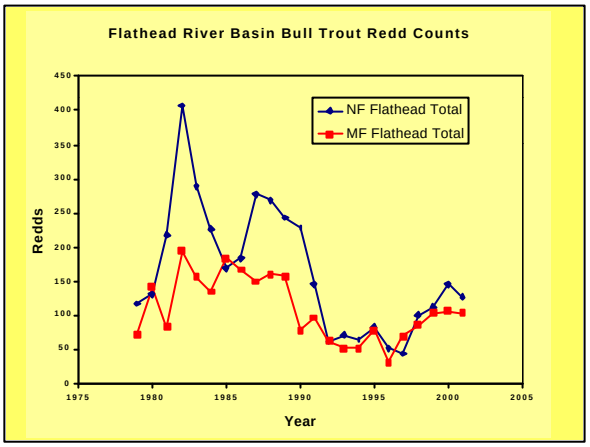

Figure 10

Two kinds of variability ('error') which obscure signal in the data

- **"Process error"** – variation in annual abundance due to random variation survival rates
- **"Measurement" or "observation" error** - error in redd counts and inaccurate temporal and spatial coverage

Figure 11

Simple trend (regression) method

- log of redd count vs time as independent variable – slope is estimate of instantaneous growth rate (Maxell 1999)
- Probability of extinction at a given time estimated from distribution expressing uncertainty in future population size extrapolated from trend (prediction band)
- Fewest assumptions, life history independent
- Maxell (1999) 15 years to detect 50% change in λ, critical to reduce error in redd counts, & use 1 tail test initially for detecting decline

Figure 12

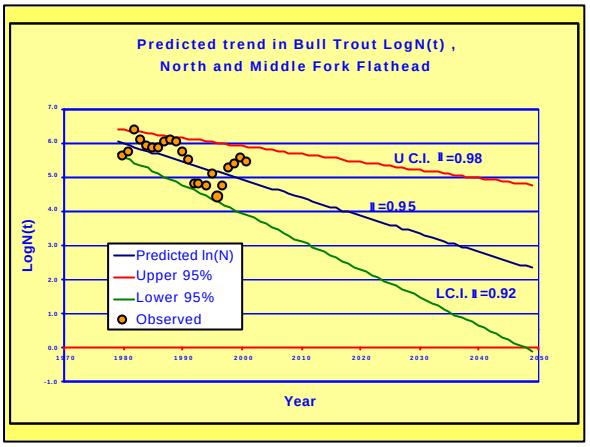

Figure 13

Other Trend Analysis

- ***Dennis Model*** computes trend and extinction probabilities directly from data through use of formulas derived analytically applied to bull trout by USFS. Growth rate and extinction probabilities sensitive to choice of first and last year of data.
- ***Rank Correlation / Randomization*** method of Rieman and Myers (1997) only estimates significance and magnitude, variation in redd counts makes the detection of declining trends in individual streams unlikely with "limited data sets". Pooled counts within basin, declining trend in Flathead and Pend Oreille basins

Figure 14

Example Tiered Design for Bull Trout Monitoring and Evaluation Program

- **Tier 1:**
  -Spawning Abundance and Trends
  -Distribution of population (expansion/contraction)
  -Genetic Diversity
- **Tier 2:**
  -Intensive spawning area surveys
  -Juvenile Abundance
  -Biological Characteristics
- **Tier 3:**
  -Identification of precise management activities
  -Life stage survival estimates
  -Assess effectiveness of recovery measures on population trends and viability

Figure 15

Monitoring and Evaluation ExampleTier 1:

Spawning Abundance

- **Identify current methods for abundance(eg. Redds, traps)**
- **Examine present techniques and area coverage**
- **Recommend survey methods and additional index areas**
- **Evaluate methods for detecting trends and how long a time series is needed**

Distribution

- **Identify current methods for distribution**
- **Examine present techniques and coverage**
- **Recommend survey methods, area, and timing(eg. AFS & WDFW protocols)**
- **Evaluate methods for detecting contraction/ expansion of the range**

Figure 16

Summary

- **Clearly articulate goals and objectives**
- **Collaboratively design a M&E**
- **Explore possibility of using a tiered M&E program to efficiently use limited resources**
- **Design and initiate survey needs to evaluate abundance, trends, and distribution**
- **On longer term basis:**
  - **design and implement more intensive surveys for M&E**
  - **Develop other theoretically based methodologies to evaluate potential recovery measures**

Figure 17